

**Independent Peer Review Report to the Center for Independent
Experts**

**SEDAR 42 Gulf of Mexico Red Grouper
Review Group 14-16 July 2015, Miami, Florida, USA**

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Executive Summary

The SEDAR 42 review workshop was held at Hotel Courtyard, Coconut Grove, 2649 South Bayshore Drive, Miami, Florida 33133 USA, from 9:00 a.m. on Tuesday, July 14, 2015 through 6.00 p.m. on Thursday, July 16, 2015. The aim was to review the assessment of red grouper in the Gulf of Mexico. The meeting was conducted in comfortable surroundings with excellent facilities and with a spirit of co-operation from all participants.

The review committee was composed of Luiz Barbieri (Chair, Scientific and Statistical Committee - SSC), Ben Blount, SSC, and Kai Lorenzen, SSC, and three scientists affiliated with the Center for Independent Experts (CIE): Matt Cieri, Geoff Tingley, and Henrik Sparholt. The SEDAR42 was assisted by the NMFS Project Contact Julie A. Neer, SEDAR Coordinator, and Charlotte Schiaffo, from the Gulf of Mexico Fishery Management Council (GMFMC).

Background information and the assessment of red grouper were presented on behalf of the assessment group by Meaghan Bryan, assisted by Adyan Rios and Shannon Cass-Calay.

The SEDAR42 review panel requested a few additional sensitivity analyses to the assessment models and reference point estimates. These were accommodated by the analytical team at the meeting.

The Panel was impressed with the improvement in the scientific level of assessment over the past decade or two going from just a catch curve analysis to a full-blown statistical model (Stock Synthesis (SS)). The stock assessment clearly now represents a data rich case. The extensive data available for the assessment appeared to be well compiled, and their use in the assessment and reference point analyses was in general accordance with best available science. There was, however, an issue with discards modelling for the commercial fleets. It seems that the fleet selectivities for these were calculated based on landings only, and these selectivities were combined with retention curves to obtain discards estimates. This seems problematic. What rather should have been done was to base the selectivity estimation on both landings and discards. Because the landings data are age-based and the discard data are length-based it was not straightforward to rectify this at the meeting. The solution used in the base run by the AW (down-weighting the discard data for the commercial fleet) seems as a fair interim solution and will likely give sensible relative SSB values and biomass reference points, but F and R would be underestimated and so will F reference points. Alternative runs (requested by the Panel) up-weighting the discard data could be considered but these contained biases the other way around. The Panel strongly recommended that a new assessment be done including commercial discard data either as a separate fleet (or fleets) or as age-based values (outside the SS model using relevant age-length keys) so that the selection of the commercial fleet is modelled correctly. The Panel was confident that this will substantially improve the

assessment and regarded this as a “low hanging fruit” because of the limited extra workload (a few person days of work by the data and assessment experts) that would be needed.

In spite of this issue with the assessment, the base run and various sensitivity runs indicated that the red grouper stock is not experiencing overfishing and is not overfished.

Regarding research, it seems to be time now to focus research on simple and robust ways to include in a dynamic way (like the way stock-recruitment is included) density dependence in growth, maturity, and cannibalism in the assessment as they potentially can influence biological reference points like F_{msy} and B_{msy} substantially. Wider multispecies and ecosystem consideration like ecosystem-MSYs and mixed fisheries MSYs seem to be a bit further into the future. For the first issue, the OSMOSE and ECOSIM-ECOPATH models are too complicated probably, but quite suitable for the latter issue.

All participants have made a significant contribution to the review process. I have participated in several SEDAR reviews since 2004 and the process has developed over the years from good to outstanding.

It should, however, be noted that the process was prolonged to after the end of the meeting as the detailed outcome of the requested runs were not all available at the deadline for this report. Thus, the Panel could not finalise its review before the deadline of this CIE report. Most, if not all, Panel members agreed to continue the discussion and because the Summary report has a later deadline than the present CIE report, some of the issues raised in the present CIE-report might be resolved in the days following.

Background

The SEDAR42 (Southeast Data, Assessment and Review) workshop convened in Miami, Florida, from Tuesday, July 14, through Thursday, July 16, 2015, to review the assessment of red grouper (*Epinephelus morio*) in the Gulf of Mexico.

The review committee was composed of Luiz Barbieri (Chair, Scientific and Statistical Committee - SSC), Ben Blount, SSC, and Kai Lorenzen, SSC, and three scientists affiliated with the Center for Independent Experts: Matt Cieri, Geoff Tingley, and Henrik Sparholt. The SEDAR42 was assisted by the NMFS Project Contact Julie A. Neer, SEDAR Coordinator, and Charlotte Schiaffo, from the Gulf of Mexico Fishery Management Council (GMFMC).

Background information and the assessment of red grouper were presented on behalf of the assessment group by Meaghan Bryan, assisted by Aryan Rios and Shannon Cass-Calay.

About two weeks before the meeting, the assessment documents and supporting material were made available to the SEDAR42 via an Internet server. During the SEDAR42 meeting, all documents were available electronically and it seems also in print.

The meeting opened with presentations on the Terms of Reference during which questions pertaining to the materials presented were open for question and clarification, followed by general open discussion on the Terms of Reference and concluding. The entire review committee participated in the review of each term of reference. The meeting was open to the public and public comments were accepted during that time.

The first day of the meeting (Tuesday morning) was devoted to presentations made by Meaghan Bryan, and Adyan Rios on behalf of the Assessment Working Group, which after an introduction, addressed the Terms of Reference.

The SEDAR meeting provides an effective and productive means of reviewing the assessments. Overall, the Panel was impressed by the nature of the process and the efforts that went into assessment development. The material mailed to the reviewers before the meeting was very comprehensive and appropriate. The organizers are greatly commended for that. The time available to go through all the material was appropriate and it was good that the Panel could concentrate on one stock only, as opposed to other CIE meetings where several stocks are dealt with at the same meeting. To have to split the attention on two or more stocks, and keep them separate mentally, is an extra mental burden that was good to avoid. It was very positive that many older background papers were made available already 3-4 weeks before the meeting.

Description of my role in the Review Activities

I worked as a CIE reviewer and conducted an impartial and independent peer review of the assessment. I have expertise in stock assessment, statistics, fisheries science, and marine biology from working over 30 years with these issues in mainly the Northeast Atlantic.

Summary of Findings for each ToR, weaknesses, strengths, conclusions and recommendations

The findings are specified below after each number of the ToRs.

“1. Evaluate the data used in the assessment, including discussion of the strengths and

weaknesses of data sources and decisions, and consider the following:

- a) Are data decisions made by the DW and AW sound and robust?*
- b) Are data uncertainties acknowledged, reported, and within normal or expected levels?*
- c) Are data applied properly within the assessment model?*
- d) Are input data series reliable and sufficient to support the assessment approach and findings?"*

Both DW and AW decisions were sound and robust given the lack of sampling and other uncertainties. However, the Review Panel suggested a number of alternatives and sensitivity runs to the base model to explore how sensitive the model outputs were to input data uncertainties.

Overall, the data uncertainties were acknowledged, reported, and within expected levels given low fishery dependent sampling.

Overall, the application of the data within the model was properly done. However, the Panel did recommend changes to the model structure as well as sensitivity analysis to examine model behaviour in light of data variability and uncertainty.

The restricted geographic range of the surveys, the high discard rates and low at-sea sampling, and the socio-biology of the species spawning behaviour made us uncertain about the model estimates and a number of model runs were made to test the sensitivity of the model results, and to examine model behaviour. These runs included: modelling the recreational fleet as one fleet, as was done in the previous benchmark, starting the model at 1993 to better span the periods with homogenous fishery dependent and independent sampling, relaxing the fit to the landings in light of the transition from MRFSS to MRIP, removing the fishery dependent abundance indices given issues with hyper-stability, increasing and decreasing the fit to the discards and the length distributions of discards given low sampling, and the steepness of the S-R model. For these runs resulting residuals and selectivity's were examined to observe model behaviour. The model was rather sensitive, and I would like to see a run where the discard data from the commercial fleet are included in a way that allows these data to be included in the models estimate of selectivity (see below).

It would be good to see weight or length at age data by year so that density dependence growth can be checked. The same can be said about maturity and gender transition. Regarding natural mortality, red grouper is a cannibalistic species according to the OSMOSE and ECOPAT/ECOSIM work presented. Thus, density dependence in that part of the natural mortality would also be valuable to look into.

The age determination validation analysis was quite old and it would be good to get new input here. There are various new methods available.

Red tide mortality in 2005 was looked a bit into by the DW and AW and the conclusion was to use the same extra natural mortality for all age groups. However, it was striking that the year class 2004, i.e. age 1 in 2005, was by far the smallest year class in the whole time series. Could the reason be that this year class was especially hard hit by the red tide? This could be looked further into.

A list giving precisely and completely which input data were used in the model run would be good. It is good to include the actual input file as an annex (34 pages!), but for the reader a one to two page overview (without the actual numbers) would be helpful.

In general the progress made over a few decades in the assessment data availability for this stock is quite impressive. Two to three decades ago only a catch curve analysis was done.

“2. Evaluate and discuss the strengths and weaknesses of the methods used to assess the stock, taking into account the available data, and considering the following:

- a) Are methods scientifically sound and robust?*
 - b) Are assessment models configured properly and used consistent with standard practices?*
 - c) Are the methods appropriate for the available data?”*
- a) *Are methods scientifically sound and robust?*
The stock was assessed using the SS3 software. This is a modern and up to date assessment tool which is very flexible and designed to handle assessments like this. It is scientifically sound and robust if configured appropriately. There is a small issue around its documentation. The software is being developed and updated constantly and the user guide is often lagging behind. Proper tests of each new version could also be an issue as the best test is often the test of time. SS3 demands a very high level of experience by the user and often the person behind the tool (Rick Methot) has to be called for assistance. Given that the SS3 works correctly and that the user is experienced, it is probably the best assessment software available for assessments like the present one.
- b) *Are assessment models configured properly and used consistent with standard practices?*
A major problem was apparent in the model configuration. Discard data from the commercial fleets were not fitted well by the model. The curve below in Figure 1 illustrates the problem for the long-line fleet.

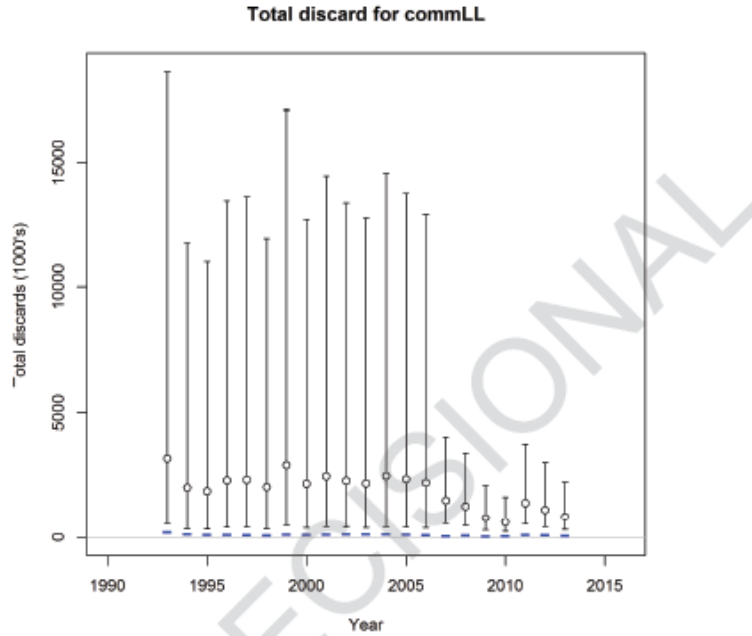


Figure 3.2.7 Observed (open circles) and predicted discards (blue dashes) (thousands of fish) of Gulf of Mexico Red Grouper from the commercial longline fishing fleet, 1993-2013.

Figure 1: Commercial long-line discards

It can be seen that in reality the model squeezed out the discard data from the analysis by estimating discards to be very close to zero. The Panel was informed by the assessment team that they had to down-weight the discard data in order for the model to work properly on the rest of the data. After several sensitivity runs and long discussions and reflections, it was revealed that the reason for the bad fit was that the selectivity for the commercial fleets was only considering the retained data (i.e. landings data) and not, as would have been correct, both the retained and the discard data. This means that the SS3 model struggles to find enough young fish (those that normally are discarded) in the stock to fit the observed discard data and therefore estimates the discarded numbers of red groupers to very low numbers. The current version of the SS3 model software cannot handle landings data given in numbers-by-age and discard data given in numbers-by-length for a given fleet in this context; it has to be either both data types in numbers-at-age or both data types in numbers-by-length. Therefore, in order to correct the problem one has to be a bit innovative and the Panel suggested trying to include the discard data as a separate fleet (or fleets), or alternatively to convert the discard data from number-at-length to numbers-at-age using age-length keys outside the SS3 model. However, both options are a bit time consuming (say 3-5 work-days by the assessment person) and this was not possible to do during the meeting. It was, however, strongly recommended by the Panel that this be done as soon as possible after the meeting. The Panel was confident that this would constitute "a low hanging fruit" that would mean a substantial improvement of the assessment. This will only mean a minor additional workload compared to the very substantial workload done in order to be at the present stage in the assessment process.

The importance of getting this right depends on the importance of discards in the fishery and for the stocks dynamics. The data presented on discards were high - more fish by number was discarded than landed. The Panel therefore dug deeply into the reliability of the observations. As normally is the case for discard data, they were only occasionally sampled and had large CVs. However, various indications of their overall magnitude supported the reliability of the general level of discard observation data presented in the assessment report. Stakeholders (fishers) at the meeting phoned a large number of colleagues during the meeting and asked them about the likely amount of the discards. They by and large confirmed the data. Thus, the Panel concluded that discard data were an important element of the assessment.

In order to see how much all this affected the outcome of the assessment in terms of stock status and fishing pressure, various modifications of the SS3 base run to circumvent the problem were tested. By reducing the CV of the commercial discard data (in total numbers), increasing it on the discard length distribution, and letting the model estimate retention curves, it was possible to fit the discards in numbers. The time span of the data was shortened to start in 1993 instead of 1986 in order to have a more consistent situation for discards (and for the video survey). However, all this was at a cost of a poor fit to the discard length distribution (the model as expected estimated much more large fish discards than were observed) and the retention curve estimated was very steep indicating that almost 100% of catch of below 52-53 cm were discarded while those above were all retained (which seems peculiar that fishers should discard legal sized fish - a few cm larger than the legal size - almost 100%). Also, the selection pattern by fleet deteriorated as they became bimodal. Clearly indications of a situation, where the model with these modifications, was not fitting the data well, re-emphasising the importance of the Panel's recommendation of redoing the SS3 with discard data included in a way that they are used in the estimation of the selectivity of the commercial fleets. Various other modifications to the model were also run, like fixing the steepness of the S-R to close to 1, merging the Headboat recreational fleet with the two other recreational ones, and putting more weight on the surveys.

The overall impression was that it did not change the trend and level of the spawning stock size nor the fishing mortality very much. The Panel did not have much time to analyse what it meant for reference points, like F_{msy} and $F_{30\%SPR}$, but it is likely that the effect of the discard problem would be greater here. However, the stock biomass was in the cases tested well above reference levels and the F well below, so the basic question of whether the stock is overfished or is experiencing overfishing can still be answered with a "No" for both.

Selection pattern is always difficult to estimate in stock assessments. The question is how dome shaped is it or maybe even flat. Usually, there are not data or knowledge to estimate this. The type of data needed would be reliable observations of absolute numbers of the older component of the stock, which almost never are available. In the current assessment, a random

walks approach was used, with no trend assumed. This seems to work quite well and put a flat selection on the long line survey data, which seems reasonable, as this survey covers the total distribution area of the stock, and one would not expect much hook size selection in the upper fish size range. This gave a dome shaped selection for the other fleets. For the commercial fleets the selection on older fish decreased to about half the one on the main age selected for, which seems reasonable as the fishers probably do not fish so much in very deep water where there are older fish and fewer fish than in shallower water where the main age groups of the stock are found. The shrimp trawl survey had a very low selection on older fish and given that the survey covers the entire distribution area (shallow to deep water) of all age groups, the reason could be that the gear simply is hauled too slowly or the net opening is too narrow for catching the older fish.

The stock recruitment relationship was not very informative. There was almost no correlation between R and S . The Panel found that a steepness (h) of 0.8 was a bit high compared to other comparable fish stocks (around 0.9 would be more in line with other similar stocks) and concluded that it was better to fix it to almost one (here 0.99). Fixing $h = 0.99$ should not be interpreted as a measure of very high stock productivity of the stock at very low stock sizes, but is merely a method for implementing a forecast going forward with random recruitment.

The Panel did not have much time to discuss the reference points due to the need to spend much time on the discard problem mentioned above. However, the immediate opinion of the Panel was that to compensate for the uncertainty in the productivity of the stock, the review group suggests basing reference points on SPR rather than developing MSY reference points.

A minor point was that the s-r model was estimated with 4 parameters, steepness, R_0 and R_1 , and a variance parameter, while only 3 parameters seems to be needed, as two of the three parameters: steepness, R_0 and R_1 , would suffice to determine the shape of the B&H S-R curve.

Another minor issue was that the selection patterns used for the commercial CPUE indices were identical to that for the total fishery by the given fleet. This was questioned, because the indices were calculated based on GLM models which take care of part of the selectivity of the commercial fleets, by e.g. stratifying by depth. However, it seems that the SS3 cannot easily accomplish that sophistication.

Red tide mortality was taken care of by creating an artificial fleet with only catch (all discards) in 2005. The Panel was informed that this worked well for the gag assessment conducted recently. The Panel found this approach sensible. Some gradual ramping of M could be tried and it was also mentioned that if the red tide is a usual phenomenon, then it is implicitly included in Hoenig's formula (because it will influence the observed maximum age) in which case the approach was a kind of double counting for that mortality. The data presented and the

knowledge about the red tide events made the Panel comfortable with the approach chosen by the assessment group.

c) *Are the methods appropriate for the available data?*

Even though the SS3 model cannot handle landings and discard data from a given fleet given in different units (by age or by length), the model can still be used and is still appropriate, if the discard data in this case are transformed outside the model from length to age-based using appropriate age-length keys, or alternatively, the discard data are inserted as a separate fleet (or fleets). There might also be other ways to circumvent the problem. Of course the best thing would be if the SS3 software is modified to be able to use both age and length-based data from a given fleet, but this is a larger task and can probably only be done by the SS3 software developers.

“3. *Evaluate the assessment findings and consider the following:*

- a) *Are abundance, exploitation, and biomass estimates reliable, consistent with input data and population biological characteristics, and useful to support status inferences?*
- b) *Is the stock overfished? What information helps you reach this conclusion?*
- c) *Is the stock undergoing overfishing? What information helps you reach this conclusion?*
- d) *Is there an informative stock recruitment relationship? Is the stock recruitment curve reliable and useful for evaluation of productivity and future stock conditions?*
- e) *Are the quantitative estimates of the status determination criteria for this stock reliable? If not, are there other indicators that may be used to inform managers about stock trends and conditions?”*

a) *Are abundance, exploitation, and biomass estimates reliable, consistent with input data and population biological characteristics, and useful to support status inferences?*

As stated above, the Panel would much prefer to see a revised assessment with discard data included in the selection pattern estimates for the commercial fleets. However, some deductions can be made of the current assessment. This is mainly because the stock is so well clear of the reference points that a revised assessment is unlikely to change this status. The run where discards are not underestimated should in that case be the one to use for setting catch limits and reference points. The base run in the assessment report should probably not be used because it ignores almost completely the commercial discard data and will therefore bias the F reference points upwards, and biomass reference points downwards.

In the AW report several different units of fishing mortality were used and it was not always clear which unit was used. Ideally, only one unit should be used in order to simplify comparison.

b) *Is the stock overfished? What information helps you reach this conclusion?*

The various runs all supported the notion that the stock has increased in recent years and is not overfished.

c) *Is the stock undergoing overfishing? What information helps you reach this conclusion?*

The various runs all supported the notion that fishing mortality has decreased in recent years and that the stock is not undergoing overfished.

d) *Is there an informative stock recruitment relationship? Is the stock recruitment curve reliable and useful for evaluation of productivity and future stock conditions?*

The stock recruitment relationship is not informative as the relationship observed is almost flat, i.e. no correlation between R and S. The unknown feature is how quickly recruitment gets impaired if the stock declines to sizes lower than hitherto observed. As long as the stock is maintained above the lowest observed level, recruitment should not be impaired.

e) *Are the quantitative estimates of the status determination criteria for this stock reliable? If not, are there other indicators that may be used to inform managers about stock trends and conditions?*

The review panel concluded that the MSY benchmarks for the red grouper stock in Gulf of Mexico stocks provided by the AW were not reliable because of the uncertainty about the stock-recruitment relationship. Therefore, the 30% SPR reference level was chosen based on past practice for this stock.

However, this might change if a new assessment, which is strongly recommended to be performed, shows that the stock recruitment relationship is more informative and if the steepness estimates from this will be more in line with that of similar stocks, i.e. around 0.9. In that case, MSY reference points might be looked upon positively.

The uncertainty of 30% SPR reference points with respect to the relevant estimated productivity processes (i.e. growth, maturities, selectivities) was not evaluated.

Care should be taken to avoid stock declines to below the lowest observed stock size because the productivity at such lower stock sizes is not well established.

Female egg production (fecundity) was used in deriving the stock biomass reference points. This seems appropriate. Gonad weight was judged problematic as red grouper is a batch spawner, and thus gonad weight fluctuates over the spawning season. Female mature biomass might be a robust alternative, but will miss changes in fecundity due to poor growth, density dependence and the like. It is suggested to also consider including male mature biomass for this stock as a reference point, because apparently the percentage of males can get very low for species like this, which are first females and at a later stage become males (protogynous

hermaphroditism).

On a longer term basis, it was considered useful to analyze and reflect on including density dependence in growth, sex change, maturity, and cannibalism mortality in the reference point determination, in order to get these as realistic and unbiased as possible.

“4. Evaluate the stock projections, including discussing strengths and weaknesses, and consider the following:

- a) Are the methods consistent with accepted practices and available data?*
- b) Are the methods appropriate for the assessment model and outputs?*
- c) Are the results informative and robust, and useful to support inferences of probable future conditions?*
- d) Are key uncertainties acknowledged, discussed, and reflected in the projection results?”*

The stock projections method was consistent with accepted practices, and the available data used were appropriate for the assessment model and outputs. Given the problems mentioned above with the assessment (that it would be appropriate with a new assessment run including commercial discard data in a better way), the results are uncertain in terms of robustness and unbiasedness. The stock biomass, however, is so well above its reference point and fishing mortality so well below its reference point that for inferences about being overfished and whether overfishing is occurring, both can safely be claimed to be in the positive territory. It is more problematic with the forecasted landings given various aims like MSY. Here, the present model or models are less robust, and a new assessment would be very valuable.

“5. Consider how uncertainties in the assessment, and their potential consequences, are addressed.

- Comment on the degree to which methods used to evaluate uncertainty reflect and capture the significant sources of uncertainty in the population, data sources, and assessment methods.*
- Ensure that the implications of uncertainty in technical conclusions are clearly stated.”*

The uncertainties were well treated by the assessment and forecast. The SS3 model and its configuration were set appropriately, and several illustrative examples were presented. It was clear that the natural mortalities are uncertain and these uncertainties are reflected in quite large changes to biomass, and fishing mortalities historically when alternative sets of natural mortalities are used in the SS3 runs. However, there is no easy repair for this and is something which is unlikely to be resolved in the near future. Cannibalism will need to be researched more and included directly in the assessment and forecast models in the future when there is knowledge about how to do it for this stock.

“6. Consider the research recommendations provided by the Data and Assessment workshops and make any additional recommendations or prioritizations warranted.

- Clearly denote research and monitoring that could improve the reliability of, and information provided by, future assessments with particular emphasis on the Deepwater Horizon Oil Spill*
- Provide recommendations on possible ways to improve the SEDAR process.”*

The Panel largely supported the recommendations made by the DW and AW, with a few moderations as explained below. The Panel added the following to the list of research recommendations:

1. Red grouper are found throughout the Gulf of Mexico and in the Atlantic from Brazil to the southeastern US. Catch levels and age composition data from Cuba, the Caribbean, and especially Mexico would allow for more complete stock assessment. Data could be obtained from the Mexican organization MEXAS.

2. Research is needed to help address questions about how fecundity can best be measured. Fecundity is a preferred measure for stock biomass and is a function of the number of eggs produced, but it has to be measured indirectly. Gonad weight can be used as a proxy, but obtaining reliable weights can be problematic, dependent in part on methods and timing of data acquisition. Research to address more accurate measurement of gonad weight and to develop protocols would be helpful.

3. Questions were raised in workshop discussions about changes in reproductive success with age and with population concentration. Although it is known that reproductive success is mitigated by social factors, the degree and extent of mitigation is not well understood. More data are needed to better address the topic, including addressing time-varying changes within age categories. How much variation exists in size at age? Insufficient information leads to greater uncertainty and can have impacts on reference points.

4. The review panel raised questions throughout the evaluation of the assessment reports about the basis or bases of decisions to use the variables actually used. The recommendation is for analysts to provide a justification or rationale for the selection criteria. Review panel evaluations could be more accurately motivated if the selection criteria were better reported. Selection criteria would thereby be carried forward in the evaluations.

5. Actual measures of individual growth are needed within age categories, as opposed to relying on common assumptions about growth rates and outcomes. Differential growth rates may occur in stock sub-structure within localized species, due to characteristics of the stock and ecosystem variables, or both. They may also affect schedules for hermaphroditic changes, impacting sex-age class composition.

6. Paralleling the AW Report, discussions in the Review Workshop focused on initial conditions of the red group stock, including assessment of the stock from 1986 to 1993. Composition data were more complete from 1993, raising questions about methods to approach composition prior to that data, in effect, how to decide on what methods and procedures to use and how to establish preferences. The sense of the Review Workshop members was that procedures of ramping up were needed.

7. The core problem in the red grouper assessment was the data on discards. Procedures for reporting discards were not consistent across the fleets, and the fit to indices were poor, leading to major sources of uncertainty. Numerous sensitivity runs helped to reduce the lack of fit, especially up-weighting the commercial fishery dependent data, but problems remain. Research to address best practices in the reporting of discards is needed in regard to the red grouper stock. Especially useful, also, would be to increase the number of observers and observations among the commercial fleets. A quick fix to the problem of the SS3 model not including the commercial discard data in the selectivity estimation of the commercial fleets could be to add discards as separate fleet(s) in the model or to convert the input discard data from length-based to age-based before inputting the data to the SS3 model. A more correct way forward would be to change the SS3 software so that it can handle discard data given by length and landings data given by age for a given fleet.

8. The average age, and thus size, of females changing to males are known, but a more complete understanding of the conditions under which the changes occur would be helpful for assessing stock size. The number of males in relation to minimum stock size would be a useful metric for stock assessments.

9. Sensitivity runs to assess the impact of the 2005 red tide event on red grouper landings did not show any significant differences from the base model, including fit to discards. Documentation of the red tide mortality, however, presents methodological difficulties. Although analyses of data suggest that red tide primarily affected ages 0+, composition of the red tide kills are difficult to measure, given problems of access to the red tide zones and incomplete records of age, size, and sex in the kills. In addition, red tide events may be best considered in reference to ecosystem considerations (SEDAR42-5W-01). As environmental indices become incorporated into single stock species, criteria for inclusion have to be tested and measured, toward a goal of balanced biological and mechanistic explanation, statistical significance, and predictive performance. More research for red tide impacts on red grouper stock status is especially appropriate, given that the majority of landings are on Florida's West Continental Shelf, where high concentrations of red tide tend to be located.

SEDAR 42 did not directly address the impacts of Deepwater Horizon on red grouper stock

status. Earlier SEDAR Workshops, for example, SEDAR 31 (red snapper), contained discussions and research recommendations. SEDAR 42 contains analyses and recommendations relevant for events such as oil spills, however, in the attention given to the 2005 and 2014 red tide events. Oil spills can be measured as environmental events in a variety of ways, including the event as equivalent to a fleet source for fishing mortality. Ecosystem considerations (see 9 above) can also be utilized to assess impacts on stock status.

Biological reference points are often very sensitive to density dependence. On a longer term basis it was considered useful to analyze and reflect on including density dependence in growth, (sex change, maturity,) and cannibalism mortality in the reference point determination, in order to get the biological reference points as realistic and unbiased as possible. This would need, among several other things, that size-at-age historically to be compiled from the existing data bases. It would also need to estimate cannibalism from OSMOSE Ecopath/Ecosim and similar models on an age basis and a relationship between cannibalism mortality by age and maybe SSB (or biomass of say +60 cm red groups) like, for instance, as done for the Baltic Sea cod stock in subdivision 25-32 in ICES. Even rough simple models would be useful as these are likely to be substantially better than ignoring the density dependence of growth and cannibalism. It is regarded as less important to consider sex change and maturity, because the relationship between R and SSB seems weak, for the dynamic range experienced in the past and relevant for the medium term (0-5 years) future.

The age determination validation analysis was quite old and it would be good to get new input here. There are various new methods available.

A topic of discussion throughout the Review Workshop was the need for more attention to commonly used assumptions in categories of data and analyses. The rationale was to make assumptions more explicit and for consideration to be given to criteria for selection of options. The selection criteria would therefore become a part of the record as analyses move forward, and they would be subject to considerations of clarity, efficiency, and parsimony.

“7. Consider whether the stock assessment constitutes the best scientific information available using the following criteria as appropriate: relevance, inclusiveness, objectivity, transparency, timeliness, verification, validation, and peer review of fishery management information.”

The stock assessment constitutes the best scientific information available using the listed criteria, except with regard to commercial discard data. Because these are large, they influence the results quite a bit. The Panel recommended making a new run with this rectified, and the Panel was confident that this will very likely result in an assessment that constitutes the best scientific information available using the listed criteria without any exceptions.

“8. Provide guidance on key improvements in data or modeling approaches which should be considered when scheduling the next assessment.”

Given that the issue mentioned above with the commercial discard data will be resolved in the very near future in connection with the current assessment, it seems to me that density dependence in growth, in maturity and gender transformation, and in cannibalism would be the most important issues to concentrate on, when scheduling the next assessment.

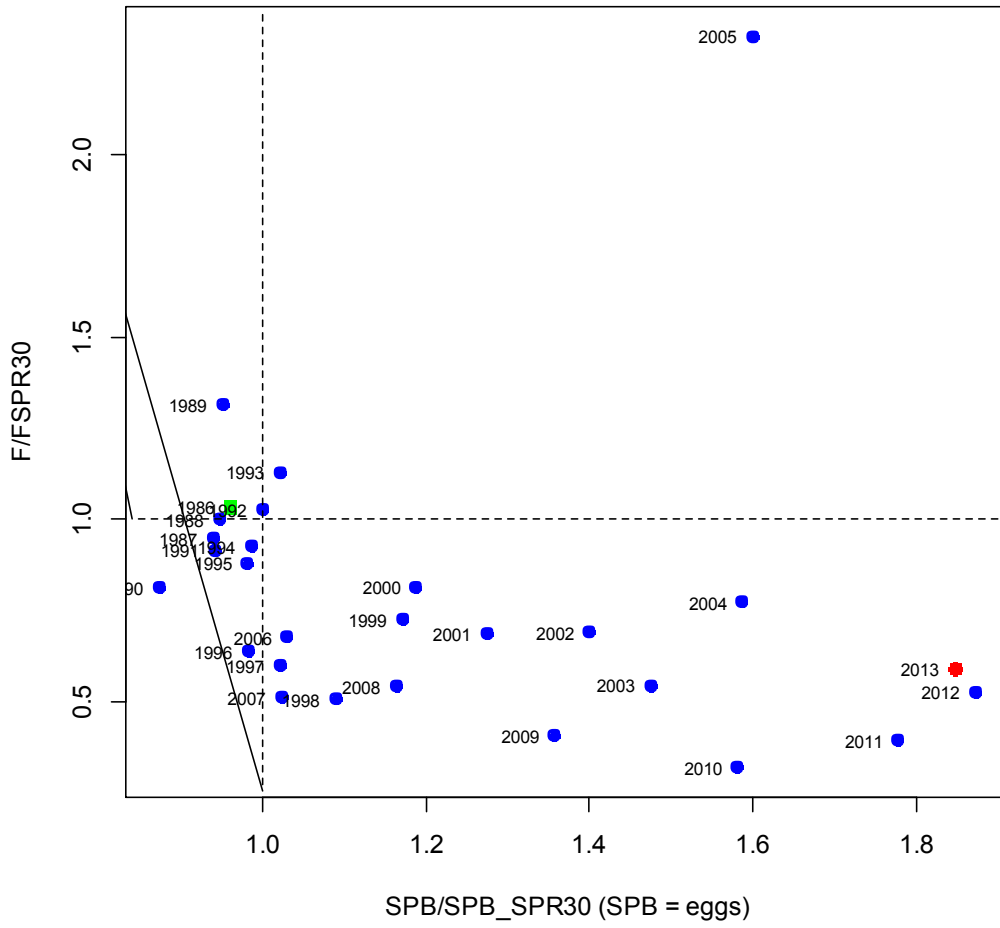
“9. Prepare a Peer Review Summary summarizing the Panel’s evaluation of the stock assessment and addressing each Term of Reference.”

This was done mainly after the closure of the meeting and not finalised before the deadline of this report. The issue with the commercial discard data took up a large part of the meeting time. It was satisfactory that the root of the issue was clarified and that constructive suggestions for the way forward could be made by the Panel. However, the cost was that the Panel had to discuss the summary report by correspondence, which is less effective than a physical meeting discussion. In spite of that, the Panel generally agreed on all substantial matters with no minority statements likely to be made in the final Summary report.

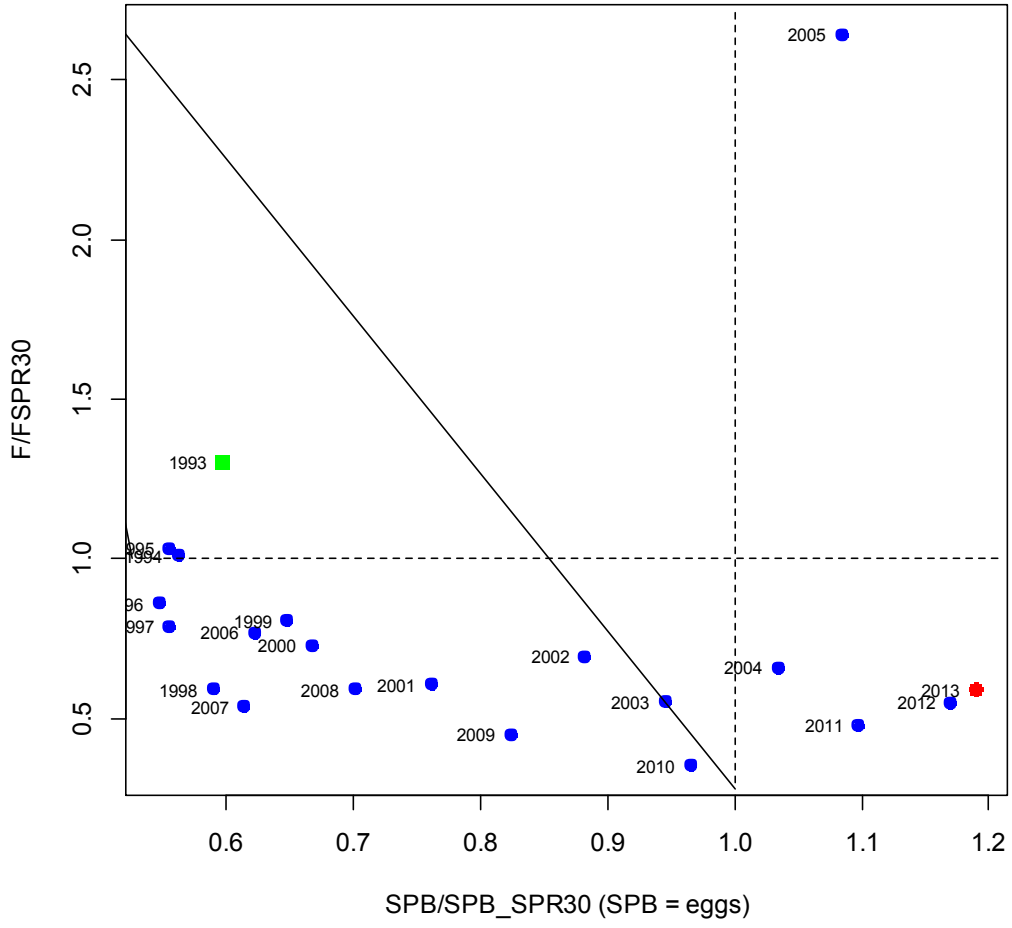
Material presented to the Panel by email on the date (30 July 2015) of the deadline of this report.

A new document was emailed to the Panel on the date (30 July 2015) of the deadline of this report with a more complete account of the results of the two runs (called RW1 and RW2) requested by the Panel at the meeting and with some errors corrected from a document sent 25 July 2015 to the Panel. These two runs include the commercial discard data better integrated into the assessment of the stock, but must still be regarded as quick fixes for a problem which with a few days of work could be properly corrected, namely by including in the SS3 runs the commercial discards data as a separate fleet or by converting the data outside the SS3 model from length-based to age-based so that the SS3 model can properly include these data when estimating the selectivity of the fleets. The base model from the AW report underestimates substantially the stock biomass while the two new runs overestimate biomasses. Furthermore, the new material presented is quite different in terms of determining stock status (especially in terms of biomass) as can be seen from the so-called Kobe plots in the new document, as shown in the three figures that follow..

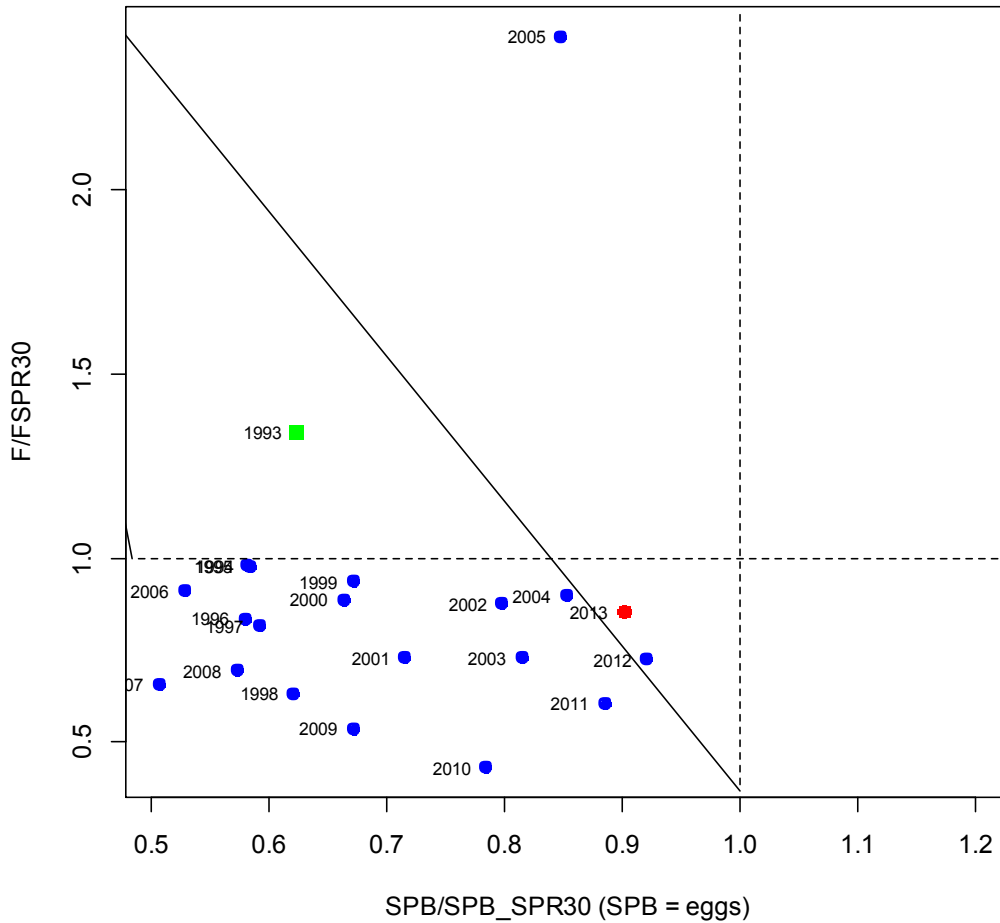
Base_orig



RW1



RW2



While the base run estimates the SSB (measured as egg production for this stock) to be above the reference point most of the years, the RW1 and RW2 runs have it the other way around. Especially, the RW2 run has SSB below the reference points in all years. This raises issues about whether the calculations were actually done correctly, because it could be expected that when a stock is fished well below the F reference point for almost all years, the biomass should be above the biomass reference points in most years. Alternatively, the F and biomass reference points could be inconsistent, which would be an equally big problem. The Panel did not have time to discuss this before the deadline of this report.

Appendix 1. Bibliography of materials provided for review.

Document #	Title	Authors	Date Submitted
Documents Prepared for the Data Workshop			
SEDAR42-DW-01	Summary of commercial red grouper (<i>Epinephelus morio</i>) catch data based on fishery observer coverage of the Gulf of Mexico reef fish fishery	Jeffrey R. Pulver, Linda Lombardi, and Elizabeth Scott-Denton	27 Oct 2014
SEDAR42-DW-02	Evaluation of the natural mortality rates of red grouper (<i>Epinephelus morio</i>) in the West Florida Shelf ecosystem using the individual-based, multi-species model OSMOSE-WFS	A. Grüss, M. J. Schirripa, D. Chagaris, P. Verley, Y.-J. Shin, L. Velez, C. H. Ainsworth, S. R. Sagarese, and M. Karnauskas ²	1 Nov 2014 Updated: 11 March 2015
SEDAR42-DW-03	Use of the Connectivity Modeling System to estimate the larval dispersal, settlement patterns and annual recruitment anomalies due to oceanographic factors of red grouper (<i>Epinephelus morio</i>) on the West Florida Shelf	A. Grüss, M. Karnauskas, S. R. Sagarese, C.B. Paris, G. Zapfe, J.F. Walter III, W. Ingram, and M. J. Schirripa	2 Nov 2014 Updated: 14 Nov 2014
SEDAR42-DW-04	Ontogenetic spatial distributions of red grouper (<i>Epinephelus morio</i>) within the northeastern Gulf of Mexico and spatio-temporal overlap with red tide events	S. R. Sagarese, A. Grüss, M. Karnauskas, J.F. Walter III	3 Nov 2014
SEDAR42-DW-05	Red Grouper Abundance Indices from SEAMAP Groundfish Surveys in the Northern Gulf of Mexico	Adam G. Pollack and G. Walter Ingram, Jr.	7 Nov 2014 Updated: 26 Nov 2014
SEDAR42-DW-06	Red Grouper Abundance Indices from NMFS Bottom Longline Surveys in the Northern Gulf of Mexico	Adam G. Pollack and G. Walter Ingram, Jr.	19 Nov 2014
SEDAR42-DW-07	Maturity, sexual transition, and spawning seasonality in the protogynous red grouper on the West	Susan Lowerre-Barbieri, Laura Crabtree, Theodore S. Switzer, and	17 Nov 2014 Updated: 21

	Florida Shelf	Robert H. McMichael, Jr.	Nov 2014
SEDAR42-DW-08	Indices of abundance for Red Grouper (<i>Epinephelus morio</i>) from the Florida Fish and Wildlife Research Institute (FWRI) video survey on the West Florida Shelf	Cameron B. Guenther, Theodore S. Switzer, Sean F. Keenan, and Robert H. McMichael, Jr.	12 Nov 2014
SEDAR42-DW-09	Indices of abundance for Red Grouper (<i>Epinephelus morio</i>) from the Florida Fish and Wildlife Research Institute (FWRI) chevron trap survey on the West Florida Shelf	Cameron B. Guenther, Theodore S. Switzer, Sean F. Keenan, and Robert H. McMichael, Jr.	12 Nov 2014
SEDAR42-DW-10	An age and growth description of Red Grouper (<i>Epinephelus morio</i>) from the northeastern Gulf of Mexico: 1978-2013 for SEDAR42	Linda Lombardi-Carlson	13 Nov 2014 Updated: 10 Dec 2014
SEDAR42-DW-11	SEAMAP Reef Fish Video Survey: Relative Indices of Abundance of Red Grouper	Matthew D. Campbell, Kevin R. Rademacher, Michael Hendon, Paul Felts, Brandi Noble, Michael Felts, Joseph Salisbury, and John Moser	13 Nov 2014
SEDAR42-DW-12	Variations in length frequency distributions and age length keys for red groupers collected in the Gulf of Mexico	Ching-Ping Chih	14 Nov 2014
SEDAR42-DW-13	The use of Otolith Reference Collections to Determine Ageing Precision of Red Grouper (<i>Epinephelus morio</i>) Between Fisheries Laboratories	Palmer, C.L., L. Lombardi, J. Carroll, and E. Crow	18 Nov 2014 Updated: 16 Dec 2014
SEDAR42-DW-14	Size Distribution of Red Grouper Observed in For-Hire Recreational Fisheries in the Gulf of Mexico	Alisha Gray and Beverly Sauls	20 Nov 2014 Updated: 15 Dec 2014
SEDAR42-DW-15	Red Grouper <i>Epinephelus morio</i> Findings from the NMFS Panama City	D.A. DeVries, C.L. Gardner, P. Raley,	5 Dec 2014

	Laboratory Trap & Camera Fishery-Independent Survey – 2004-2014	and W. Ingram	
SEDAR42-DW-16	Estimates of Historical Private/Charterboat and Headboat Fishery Red Grouper Angler Catch in the Gulf of Mexico 19xx-1980	Jeff Isely, Nancie Cummings and Adyan Rios	9 Dec 2014
SEDAR42-DW-17	Discards of red grouper (<i>Epinephelus morio</i>) for the headboat fishery in the US Gulf of Mexico	Fisheries Ecosystems Branch, Beaufort, NC	21 Nov 2014 Updated: 10 Dec 2014
SEDAR42-DW-18	Length and age frequency distributions for red groupers collected in the Gulf of Mexico from 1984 to 2013	Ching-Ping Chih	11 Dec 2014
SEDAR42-DW-19	Index report cards	Indices Working Group	17 Dec 2014
Documents Prepared for the Assessment Process			
SEDAR42-AW-01	Red tide mortality on red grouper (<i>Epinephelus morio</i>) between 1980 and 2009 on the West Florida Shelf	Skyler R. Sagarese, Alisha M. Gray, Cameron H. Ainsworth, David D. Chagaris, Behzad Mahmoudi	5 Feb 2015
SEDAR42-AW-02	Standardized catch rates for red grouper from the United States Gulf of Mexico vertical line and longline fisheries	Meaghan D. Bryan and Kevin McCarthy	10 March 2015
SEDAR42-AW-03	Standardized Catch Rates of Red Grouper (<i>Epinephelus morio</i>) from the U.S. Headboat Fishery in the Gulf of Mexico, 1986-2013	Adyan Rios	13 March 2015
SEDAR42-AW-04	Standardized Catch Rates of Red Grouper (<i>Epinephelus morio</i>) from the Gulf of Mexico Recreational Charterboat and Private Boat Fisheries (MRFSS) 1986-2013	Adyan Rios	13 March 2015

SEDAR 42-AW-05	Estimating age- and size-specific natural mortality rates for Gulf of Mexico red grouper (<i>Epinephelus morio</i>) using the ecosystem model OSMOSE-WFS	A. Grüss, M. J. Schirripa, D. Chagaris, P. Verley, Y.-J. Shin, L. Velez, C. H. Ainsworth, S. R. Sagarese, and L. Lombardi-Carlson	11 March 2015
Documents Prepared for the Review Workshop			
SEDAR42-RW-01	Incorporating ecosystem considerations within the Stock Synthesis integrated assessment model for Gulf of Mexico Red Grouper (<i>Epinephelus morio</i>)	Skyler R. Sagarese, Meaghan D. Bryan, John F. Walter, Michael Schirripa, Arnaud Grüss, Mandy Karnauskas	29 June 2015
SEDAR42-RW-02			
Final Stock Assessment Reports			
SEDAR42-SAR1	Gulf of Mexico Red Grouper	SEDAR 42 Panels	
Reference Documents			
SEDAR42-RD01	A Directed Study of the Recreational Red Snapper Fisheries in the Gulf of Mexico along the West Florida Shelf – Final Project Report	Beverly Sauls, Oscar Ayala, and Richard Cody	
SEDAR42-RD02	SEDAR 12-DW-11: Quantitative Historical Analysis of the United States and Cuban Gulf of Mexico Red Grouper Commercial Fishery	Steve Saul	
SEDAR42-RD03			
SEDAR42-RD04			
SEDAR42-RD05			

Appendix 2. Copy of the CIE Statement of Work

External Independent Peer Review by the Center for Independent Experts

SEDAR 42 Gulf of Mexico Red Grouper Assessment Review Workshop

Scope of Work and CIE Process: The National Marine Fisheries Service's (NMFS) Office of Science and Technology coordinates and manages a contract providing external expertise through the Center for Independent Experts (CIE) to conduct independent peer reviews of NMFS scientific projects. The Statement of Work (SoW) described herein was established by the NMFS Project Contact and Contracting Officer's Technical Representative (COTR), and reviewed by CIE for compliance with their policy for providing independent expertise that can provide impartial and independent peer review without conflicts of interest. CIE reviewers are selected by the CIE Steering Committee and CIE Coordination Team to conduct the independent peer review of NMFS science in compliance the predetermined Terms of Reference (ToRs) of the peer review. Each CIE reviewer is contracted to deliver an independent peer review report to be approved by the CIE Steering Committee and the report is to be formatted with content requirements as specified in **Annex 1**. This SoW describes the work tasks and deliverables of the CIE reviewer for conducting an independent peer review of the following NMFS project. Further information on the CIE process can be obtained from www.ciereviews.org.

Project Description: SEDAR 42 will be a compilation of data, an assessment of the stock, and CIE assessment review conducted on Gulf of Mexico Red Grouper. The review workshop provides an independent peer review of SEDAR stock assessments. The term review is applied broadly, as the review panel may request additional analyses, error corrections and sensitivity runs of the assessment models provided by the assessment panel. The review panel is ultimately responsible for ensuring that the best possible assessment is provided through the SEDAR process. The Terms of Reference (ToRs) of the peer review are attached in **Annex 2**. The tentative agenda of the panel review meeting is attached in **Annex 3**.

Requirements for CIE Reviewers: Three CIE reviewers shall conduct an impartial and independent peer review in accordance with the SoW and ToRs herein. CIE reviewers should have expertise in stock assessment, statistics, fisheries science, and marine biology sufficient to complete the primary task of providing peer-review advice in compliance with the workshop Terms of Reference. Each CIE reviewer's duties shall not exceed a maximum of 14 days to complete all work tasks of the peer review described herein.

Location of Peer Review: Each CIE reviewer shall conduct an independent peer review during the panel review meeting scheduled in **Miami, Florida** during **July 14-16, 2015**.

Statement of Tasks: Each CIE reviewers shall complete the following tasks in accordance with the SoW and Schedule of Milestones and Deliverables herein.

Prior to the Peer Review: Upon completion of the CIE reviewer selection by the CIE Steering Committee, the CIE shall provide the CIE reviewer information (full name, title, affiliation, country, address, email) to the COTR, who forwards this information to the NMFS Project Contact no later the date specified in the Schedule of Milestones and Deliverables. The CIE is responsible for providing the SoW and ToRs to the CIE reviewers. The NMFS Project Contact is responsible for providing the CIE reviewers with the background documents, reports, foreign national security clearance, and other

information concerning pertinent meeting arrangements. The NMFS Project Contact is also responsible for providing the Chair a copy of the SoW in advance of the panel review meeting. Any changes to the SoW or ToRs must be made through the COTR prior to the commencement of the peer review.

Foreign National Security Clearance: When CIE reviewers participate during a panel review meeting at a government facility, the NMFS Project Contact is responsible for obtaining the Foreign National Security Clearance approval for CIE reviewers who are non-US citizens. For this reason, the CIE reviewers shall provide requested information (e.g., first and last name, contact information, gender, birth date, passport number, country of passport, travel dates, country of citizenship, country of current residence, and home country) to the NMFS Project Contact for the purpose of their security clearance, and this information shall be submitted at least 30 days before the peer review in accordance with the NOAA Deemed Export Technology Control Program NAO 207-12 regulations available at the Deemed Exports NAO website:

<http://deemedexports.noaa.gov/>

http://deemedexports.noaa.gov/compliance_access_control_procedures/noaa-foreign-national-registration-system.html

Pre-review Background Documents: Two weeks before the peer review, the NMFS Project Contact will send (by electronic mail or make available at an FTP site) to the CIE reviewers the necessary background information and reports for the peer review. In the case where the documents need to be mailed, the NMFS Project Contact will consult with the CIE Lead Coordinator on where to send documents. CIE reviewers are responsible only for the pre-review documents that are delivered to the reviewer in accordance to the SoW scheduled deadlines specified herein. The CIE reviewers shall read all documents in preparation for the peer review.

Panel Review Meeting: Each CIE reviewer shall conduct the independent peer review in accordance with the SoW and ToRs, and shall not serve in any other role unless specified herein. **Modifications to the SoW and ToRs cannot be made during the peer review, and any SoW or ToRs modifications prior to the peer review shall be approved by the COTR and CIE Lead Coordinator.** Each CIE reviewer shall actively participate in a professional and respectful manner as a member of the meeting review panel, and their peer review tasks shall be focused on the ToRs as specified herein. The NMFS Project Contact is responsible for any facility arrangements (e.g., conference room for panel review meetings or teleconference arrangements). The NMFS Project Contact is responsible for ensuring that the Chair understands the contractual role of the CIE reviewers as specified herein. The CIE Lead Coordinator can contact the Project Contact to confirm any peer review arrangements, including the meeting facility arrangements.

Contract Deliverables - Independent CIE Peer Review Reports: Each CIE reviewer shall complete an independent peer review report in accordance with the SoW. Each CIE reviewer shall complete the independent peer review according to required format and content as described in Annex 1. Each CIE reviewer shall complete the independent peer review addressing each ToR as described in Annex 2.

Other Tasks – Contribution to Summary Report: Each CIE reviewer may assist the Chair of the panel review meeting with contributions to the Summary Report, based on the terms of reference of the review. Each CIE reviewer is not required to reach a consensus, and should provide a brief summary of the reviewer's views on the summary of findings and conclusions reached by the review panel in accordance with the ToRs.

Specific Tasks for CIE Reviewers: The following chronological list of tasks shall be completed by each CIE reviewer in a timely manner as specified in the **Schedule of Milestones and Deliverables**.

- 1) Conduct necessary pre-review preparations, including the review of background material and reports provided by the NMFS Project Contact in advance of the peer review.
- 2) Participate during the panel review meeting in Miami, Florida during July 14-16, 2015.
- 3) Conduct an independent peer review, as specified herein, in Miami, Florida during July 14-16, 2015, in accordance with the ToRs (Annex 2).
- 4) No later than August 3, 2015, each CIE reviewer shall submit an independent peer review report addressed to the “Center for Independent Experts,” and sent to Dr. Manoj Shivlani, CIE Lead Coordinator, via email to *MShivlani@ntvifederal.com*, and Dr. David Sampson, CIE Regional Coordinator, via email to *david.sampson@oregonstate.edu*. Each CIE report shall be written using the format and content requirements specified in Annex 1, and address each ToR in **Annex 2**.

Tentative Schedule of Milestones and Deliverables: CIE shall complete the tasks and deliverables described in this SoW in accordance with the following schedule.

<i>June 15, 2015</i>	CIE sends reviewer contact information to the COTR, who then sends this to the NMFS Project Contact
<i>June 29, 2015</i>	NMFS Project Contact sends the CIE Reviewers the pre-review documents
<i>July 14-16, 2015</i>	Each reviewer participates and conducts an independent peer review during the panel review meeting
<i>July 30, 2015</i>	CIE reviewers submit draft CIE independent peer review reports to the CIE Lead Coordinator and CIE Regional Coordinator
<i>August 10, 2015</i>	CIE submits CIE independent peer review reports to the COTR
<i>August 17, 2015</i>	The COTR distributes the final CIE reports to the NMFS Project Contact and regional Center Director

Modifications to the Statement of Work: This ‘Time and Materials’ task order may require an update or modification due to possible changes to the terms of reference or schedule of milestones resulting from the fishery management decision process of the NOAA Leadership, Fishery Management Council, and Council’s SSC advisory committee. A request to modify this SoW must be approved by the Contracting Officer at least 15 working days prior to making any permanent changes. The Contracting Officer will notify the COTR within 10 working days after receipt of all required information of the decision on changes. The COTR can approve changes to the milestone dates, list of pre-review documents, and ToRs within the SoW as long as the role and ability of the CIE reviewers to complete the deliverable in accordance with the SoW is not adversely impacted. The SoW and ToRs shall not be changed once the peer review has begun.

Acceptance of Deliverables: Upon review and acceptance of the CIE independent peer review reports by the CIE Lead Coordinator, Regional Coordinator, and Steering Committee, these reports shall be sent

to the COTR for final approval as contract deliverables based on compliance with the SoW and ToRs. As specified in the Schedule of Milestones and Deliverables, the CIE shall send via e-mail the contract deliverables (CIE independent peer review reports) to the COTR (Allen Shimada, via Allen.shimada@noaa.gov).

Applicable Performance Standards: The contract is successfully completed when the COTR provides final approval of the contract deliverables. The acceptance of the contract deliverables shall be based on three performance standards:

- (1) The CIE report shall be completed with the format and content in accordance with **Annex 1**,
- (2) The CIE report shall address each ToR as specified in **Annex 2**,
- (3) The CIE reports shall be delivered in a timely manner as specified in the schedule of milestones and deliverables.

Distribution of Approved Deliverables: Upon acceptance by the COTR, the CIE Lead Coordinator shall send via e-mail the final CIE reports in *.PDF format to the COTR. The COTR will distribute the CIE reports to the NMFS Project Contact and Center Director.

Support Personnel:

Allen Shimada
NMFS Office of Science and Technology
1315 East West Hwy, SSMC3, F/ST4, Silver Spring, MD 20910
Allen.Shimada@noaa.gov Phone: 301-427-8174

William Michaels
NMFS Office of Science and Technology
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Manoj Shivilani, CIE Lead Coordinator
NTVI Communications
10600 SW 131st Court, Miami, FL 33186
MShivilani@ntvifederal.com Phone: 305-968-7136

Key Personnel:

NMFS Project Contact:

Julie A. Neer
SEDAR Coordinator
4055 Faber Place Drive, Suite 201
North Charleston, SC 29405
(843) 571-4366
julie.neer@safmc.net

Annex 1: Format and Contents of CIE Independent Peer Review Report

1. The CIE independent report shall be prefaced with an Executive Summary providing a concise summary of the findings and recommendations, and specify whether the science reviewed is the best scientific information available.
2. The main body of the reviewer report shall consist of a Background, Description of the Individual Reviewer's Role in the Review Activities, Summary of Findings for each ToR in which the weaknesses and strengths are described, and Conclusions and Recommendations in accordance with the ToRs.
 - a. Reviewers should describe in their own words the review activities completed during the panel review meeting, including providing a brief summary of findings, of the science, conclusions, and recommendations.
 - b. Reviewers should discuss their independent views on each ToR even if these were consistent with those of other panelists, and especially where there were divergent views.
 - c. Reviewers should elaborate on any points raised in the Summary Report that they feel might require further clarification.
 - d. Reviewers shall provide a critique of the NMFS review process, including suggestions for improvements of both process and products.
 - e. The CIE independent report shall be a stand-alone document for others to understand the weaknesses and strengths of the science reviewed, regardless of whether or not they read the summary report. The CIE independent report shall be an independent peer review of each ToRs, and shall not simply repeat the contents of the summary report.
3. The reviewer report shall include the following appendices:
 - Appendix 1: Bibliography of materials provided for review
 - Appendix 2: A copy of the CIE Statement of Work
 - Appendix 3: Panel Membership or other pertinent information from the panel review meeting.

Annex 2: Tentative Terms of Reference for the Peer Review

SEDAR 42 Gulf of Mexico Red Grouper Assessment Review Workshop

1. Evaluate the data used in the assessment, including discussion of the strengths and weaknesses of data sources and decisions, and consider the following:
 - a) Are data decisions made by the DW and AW sound and robust?
 - b) Are data uncertainties acknowledged, reported, and within normal or expected levels?
 - c) Are data applied properly within the assessment model?
 - d) Are input data series reliable and sufficient to support the assessment approach and findings?
2. Evaluate and discuss the strengths and weaknesses of the methods used to assess the stock, taking into account the available data, and considering the following:
 - d) Are methods scientifically sound and robust?
 - e) Are assessment models configured properly and used consistent with standard practices?
 - f) Are the methods appropriate for the available data?
3. Evaluate the assessment findings and consider the following:
 - f) Are abundance, exploitation, and biomass estimates reliable, consistent with input data and population biological characteristics, and useful to support status inferences?
 - g) Is the stock overfished? What information helps you reach this conclusion?
 - h) Is the stock undergoing overfishing? What information helps you reach this conclusion?
 - i) Is there an informative stock recruitment relationship? Is the stock recruitment curve reliable and useful for evaluation of productivity and future stock conditions?
 - j) Are the quantitative estimates of the status determination criteria for this stock reliable? If not, are there other indicators that may be used to inform managers about stock trends and conditions?
4. Evaluate the stock projections, including discussing strengths and weaknesses, and consider the following:
 - a) Are the methods consistent with accepted practices and available data?
 - b) Are the methods appropriate for the assessment model and outputs?
 - c) Are the results informative and robust, and useful to support inferences of probable future conditions?
 - d) Are key uncertainties acknowledged, discussed, and reflected in the projection results?
5. Consider how uncertainties in the assessment, and their potential consequences, are addressed.
 - Comment on the degree to which methods used to evaluate uncertainty reflect and capture the significant sources of uncertainty in the population, data sources, and assessment methods.
 - Ensure that the implications of uncertainty in technical conclusions are clearly stated.
6. Consider the research recommendations provided by the Data and Assessment workshops and make any additional recommendations or prioritizations warranted.
 - Clearly denote research and monitoring that could improve the reliability of, and information provided by, future assessments with particular emphasis on the Deepwater Horizon oil spill.
 - Provide recommendations on possible ways to improve the SEDAR process.

7. Consider whether the stock assessment constitutes the best scientific information available using the following criteria as appropriate: relevance, inclusiveness, objectivity, transparency, timeliness, verification, validation, and peer review of fishery management information.
8. Provide guidance on key improvements in data or modeling approaches which should be considered when scheduling the next assessment.
9. CIE Reviewer may contribute to a Peer Review Summary summarizing the Panel's evaluation of the stock assessment and addressing each Term of Reference.

Annex 3: Tentative Agenda
SEDAR 42 Gulf of Mexico Red Grouper Review Workshop
Miami, Florida
14-16 July 2015

Tuesday

9:00 a.m.	Introductions and Opening Remarks - <i>Agenda Review, TOR, Task Assignments</i>	Coordinator
9:30 a.m. – 11:30 a.m.	Assessment Presentations - <i>Assessment Data & Methods</i> - <i>Identify additional analyses, sensitivities, corrections</i>	Meaghan Bryan
11:30 a.m. – 1:00 p.m.	Lunch Break	
1:00 p.m. – 6:00 p.m.	Assessment Presentations (continued) - <i>Assessment Data & Methods</i> - <i>Identify additional analyses, sensitivities, corrections</i>	Meaghan Bryan
6:00 p.m. – 6:30 p.m.	Public comment	Chair

Tuesday Goals: Initial presentations completed, sensitivity and base model discussion begun

Wednesday

8:00 a.m. – 11:30 a.m.	Panel Discussion - <i>Assessment Data & Methods</i> - <i>Identify additional analyses, sensitivities, corrections</i>	Chair
11:30 a.m. – 1:00 p.m.	Lunch Break	
1:00 p.m. – 6:00 p.m.	Panel Discussion/Panel Work Session - <i>Continue deliberations</i> - <i>Review additional analyses</i> - <i>Recommendations and comments</i>	Chair
6:00 p.m. – 6:30 p.m.	Public comment	Chair

Wednesday Goals: sensitivities and modifications identified, preferred models selected, projection approaches approved, Report drafts begun

Thursday

8:00 a.m. – 11:30 a.m.	Panel Discussion - <i>Final sensitivities reviewed.</i> - <i>Projections reviewed.</i>	Chair
11:30 a.m. – 1:00 p.m.	Lunch Break	
1:00 p.m. – 5:30 p.m.	Panel Discussion or Work Session - <i>Review Reports</i>	Chair
5:30 p.m. – 6:00 p.m.	Public comment	Chair
6:00 p.m.	ADJOURN	

Thursday Goals: Complete assessment work and discussions, final results available. Draft Reports reviewed.

Appendix 3. Panel Membership or other pertinent information from the panel review meeting.

Workshop Panel

Luiz Barbieri, Chair Chair, SSC
Ben BlountSSC
Matt Cieri CIE Reviewer
Kai Lorenzen.....SSC
Henrik Sparholt CIE Reviewer
Geoff Tingley CIE Reviewer

Analytic Representation

Meaghan BryanSEFSC, Miami
Adyan RiosSEFSC, Miami

Appointed Observers

Bo Gorham Recreational Fisherman
Ed Walker Industry Rep

Observers

Shannon Cass-CalaySEFSC, Miami
Nancie CummingsSEFSC, Miami
Michael Drexler..... Ocean Conservancy
Chad Hanson Pew
Bill Harford RSMAS/SEFSC
Michael Larkin..... SERO
Patrick Lynch NMFS/ST
Clay PorchSEFSC, Miami
Skyler Sagarese SEFSC/UM

Staff

Julie Neer SEDAR
John Froeschke GMFMC Staff
Ryan Rindone GMFMC Staff
Charlotte Schiaffo GMFMC Staff